



**SAN BERNARDINO COUNTY FIRE DEPARTMENT  
COMMUNITY SAFETY DIVISION**

620 South 'E' Street  
San Bernardino, CA 92415-0179  
(909) 386-8400

Standard Number

**F-2**

Revision Date:  
3-22-16

**FIRE PREVENTION STANDARD**

**FIRE SPRINKLER SYSTEMS IN ONE AND TWO FAMILY DWELLINGS**

**AUTHORITY**

Sections 102.9, 103 and 104.1 of the 2013 California Fire Code provides that the fire code official of the San Bernardino County Fire Department shall have the authority to adopt policies, procedures, rules, and regulations in order to clarify the application of the Fire Code and to specify requirements not specifically provided for by the Fire Code. For further requirements on this subject, see section 508 of the 2013 California Fire Code. This standard may be modified with the approval of the Fire Code Official.

**PURPOSE**

The purpose of this standard is to provide minimum requirements for fire sprinkler systems in one and two family residential use buildings, in order to aid in the detection and control of fires and thus provide improved protection against injury, life loss, and property damage.

**SCOPE**

This standard, in conjunction with the latest edition of NFPA 13D shall apply to the design and installation of, as well as the modification to, all fire sprinkler systems in one and two family dwellings and manufactured homes. This standard shall take NOT precedent where there is any conflict with NFPA 13D.

**DISCLAIMER**

*These standards may change without notice. Whenever applicable statutes, regulations and standards are updated and adopted, the latest shall apply. Please contact the Community Safety Division at (909) 386-8400 to determine if these standards have changed.*

*These requirements do not exempt any individual from complying with other applicable state, county, or city codes and standards.*

**SUBMITTALS**

The following shall be submitted to the Fire Department for approval and permit prior to performing any work on any fire sprinkler system:

- 1) A completed San Bernardino County Fire Department permit application



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- 2) A minimum of three (3) sets of detailed plans describing the work to be done. (For information on what must be included on plans, see sections below in this Standard and the SBCFD Plan Submittal Checklist.)
- 3) A minimum of one (1) set of hydraulic calculations for all design areas.
- 4) Manufacturer's specifications sheets (cut sheets) for all proposed materials and equipment.
- 5) A water flow test report from the water purveyor dated within one (1) year of submittal
- 6) Any other important details and information as required by this Standard.
- 7) Payment of all appropriate fees.

**DEFINITIONS**

**SELF-CONTAINED AUTOMATIC RESIDENTIAL SPRINKLER SYSTEM** An approved fire sprinkler system, that conforms to NFPA 13 D, California Residential Code Section R313 and this Fire Prevention Standard, and is supplied by a water source independent from a municipal water distribution system. If the system is mechanically assisted by booster pumps, power to the pump shall be on a dedicated circuit.

**GENERAL**

- 1) All automatic fire sprinkler systems for one and two family residential dwelling projects shall be designed to the requirements of the latest edition of NFPA 13D or California Residential Code (CRC) section R313, and other recognized standards as they apply to the hazard being protected. No deviations from these recognized standards will be made without approval from the Fire Code Official.
- 2) Water supply other than from a public water purveyor utility shall be in accordance with this Standard or the requirements in SBDFD Standard W-1 and NFPA 1142.

**SYSTEM COMPONENTS**

- 1) In living areas within the dwelling unit, only approved listed residential or quick response sprinkler heads shall be used, per the listing of the manufacturer and NFPA 13D.
- 2) All CPVC plastic pipes used shall meet the requirements of the manufacturers listing, particularly for applications when pipe is exposed.



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- 3) All system components shall be rated for the maximum working pressure, but not less than 175 p.s.i.
- 4) Piping shall be supported from structural members using methods approved by the pipe manufacturer and NFPA 13D. Devices such as "J-hooks" or plumbers tape are prohibited. Hangers shall not be attached to the structure by nails or any fastener which requires impact to fasten it to the structure. All hangers used on CPVC pipe shall be approved by the Fire Code Official.
- 5) All sprinkler riser assemblies shall be located in a wall, cabinet, or other enclosure (with a minimum twelve inch (12") wide by thirty six inch (36") high access door), unless otherwise approved by the fire code official (See **DIAGRAM F-2.1**). When required by the fire code official, the location of the riser shall be identified with a sign permanently affixed with minimum 1/4" letters on a contrasting background.
- 6) The installation of a reduced pressure (RP) device or backflow device on sprinkler system risers shall be allowed when required by the water purveyor or by the Plumbing Code for well or tank fed private systems. When such RP or backflow devices are required, they shall be secured in an open position with valve handles removed, and an appropriate allowance shall be made for all such devices in the hydraulic calculations.
- 7) Local waterflow alarms shall be provided on all sprinkler systems in homes not equipped with smoke alarms or smoke detectors in accordance with *NFPA 72, National Fire Alarm and Signaling Code*. When installed, water-flow alarm bells shall be a minimum of six (6) inches in size and bear a sign stating "WHEN BELL RINGS CALL FIRE DEPT" in minimum three quarters inch (3/4") letters on a contrasting background.
- 8) Where waterflow detection devices are installed, these devices, including the associated alarm circuits, shall be flow tested through the inspector's test connection and shall result in an audible alarm on the premises. The orifice of the ITV shall be equal to the hydraulically calculated most remote sprinkler head.

**WATER SUPPLY**

- 1) The San Bernardino County Fire Department requires only one (1) domestic water supply service (or water meter) with separate connections to domestic and sprinkler systems. Local water companies may have other requirements. It is the contractor's or owner's responsibility to contact the local water purveyor prior to design of the system to find out these and any other specific requirements.
- 2) In areas not served by a water purveyor, or where water supply is insufficient, an approved self-contained automatic fire sprinkler system is recommended and may be used to provide adequate protection. (See "SELF CONTAINED AUTOMATIC RESIDENTIAL SPRINKLER SYSTEMS")



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- 3) Water meters shall be of sufficient size to supply the demand as determined by the approved hydraulic calculations.
- 4) Water supplies shall meet the requirements of NFPA 13D or CA Residential Code section R313.

**SYSTEM DESIGN**

- 1) Residential sprinkler heads shall be designed for a coverage area in accordance with the manufacturers listing. Sprinklers other than residential sprinklers shall provide coverage as specified in NFPA 13.
- 2) Systems shall be supplied using a water meter of sufficient size to meet the hydraulically calculated demand and the manufacturer's listing for sprinkler heads used. In no case shall the meter be less than three quarters inch (3/4") unless approved by the fire code official. Hydraulic calculations shall demonstrate the appropriate pressure loss through water meters, using the manufacturer's specification or NFPA 13D.
- 3) Sprinkler systems shall be designed to provide the demand of the two (2) most hydraulically remote sprinkler heads, per the manufacturer's listings and specifications.
- 4) Systems fed by water supplies with very low inlet pressure (less than 40 p.s.i.) may utilize an approved automatic residential domestic shut-off valve, in order to eliminate the 5 GPM domestic allowances in the demand, as required by this Standard or by other connected systems, such as water softeners. Such automatic valves shall be listed for such use with fire sprinklers and be installed per the manufacturer's specifications. (See **DIAGRAM F-2.2**)

**HYDRAULIC CALCULATIONS**

- 1) Hydraulic calculations shall be provided to the fire code official demonstrating an adequate supply, from the water meter (source) to the most remote hydraulically calculated remote sprinkler(s).
- 2) All hydraulic calculations shall be designed for the system demand not to exceed 90% of the available water supply, or at least ten (10) p.s.i. below the available water supply, whichever is greater.
- 3) Hydraulic calculations shall be designed using data either from official flow tests performed by the water purveyor, or performed by a licensed contractor and witnessed by the Fire Code Official. All water flow tests used in design of sprinkler systems shall be less than one (1) year old.



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- 4) All hydraulic calculations for new systems shall have included in the demand a minimum of five (5) gallons per minute (GPM) allowance for domestic use.

**OWNER BUILDER INSTALLED SYSTEMS**

- 1) Any system that is to be installed by an owner builder must conform to the requirements of the California Business and Professions Code section 7026 et. seq., and all applicable adopted codes as well as this Standard. Such owner builders shall submit plans designed by a registered Professional Engineer (PE) or CA licensed sprinkler contractor for approval prior to starting sprinkler system installation.
- 2) Owner builders shall submit a declaration or affidavit in writing, to the satisfaction of the Fire Code Official, certifying ownership of the property and structure where the system is to be installed, and assuming all responsibility and legal liability. Owner builder shall also provide proof of sprinkler installation training given by the systems manufacturer. This documentation shall be submitted along with the application for a permit to install the system.
- 3) Owner builder installed systems shall not exceed two (2) sprinkler systems per applicant per year.

**INSPECTIONS**

All sprinkler systems are required to be inspected by the fire code official prior to final approval. The sprinkler contractor of record shall contact the appropriate SBCFD office at least forty-eight (48) hours prior to requesting and inspection, and shall notify the SBCFD office a minimum of twenty four (24) hours for any cancellation of inspections.

The following inspections shall be required for all fire sprinkler systems in one and two family residential dwellings:

1) **"OVERHEAD ROUGH INSPECTION"**:

- a) a) All piping and components, including sprinkler heads, hangers, valves, gauges, and flow switches are required to be in place and shall be exposed for visible inspection. If insulation is to be used for freeze protection, this shall be in place and fastened, and with the approval of the inspector, is permitted to cover the necessary exposed pipe.



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2) "OVERHEAD HYDRO INSPECTION":

- a) The system shall be pressurized with water at a pressure comparable to working pressure, during the duration of the inspection. All areas shall be exposed to check for leaks. Testing shall comply with the requirements of NFPA 13D.

3) "FINAL INSPECTION":

- a) The underground supply system shall be flushed before it can be connected to the overhead piping.
- b) All sprinkler heads shall be uncovered, with escutcheons or trim rings in place. For concealed heads, the cover plates shall be off. Protective guards shall be installed on all heads in the garage and storage areas, if required.
- c) A flow test shall be performed using the Inspectors Test Valve (ITV), if installed. Where waterflow detection devices are installed, these devices, including the associated alarm circuits, shall be flow tested through the inspector's test connection and shall result in an audible alarm on the premises.

**PROTECTION FROM FREEZING**

- 1) Sprinkler systems installed in areas subject to freezing temperatures and not maintained above 40°F shall be protected from freezing in accordance with the requirements NFPA 13D and the local water purveyor. The need for freeze protection shall be as determined by the Fire Code Official and based on the California Energy Commission "Climate Zones" and Part 6 of CCR Title 24, the California Energy Code. Systems located in Climate Zone 14 as defined by the California Energy Commission may be protected solely by the use of insulation. Systems located in Climate Zone 16 shall not be protected solely by the use of insulation. Detailed maps of Climate Zones may be found on the Internet at <http://www.energy.ca.gov>.
- 2) The use of 'Passive Purge' or combination systems (fire sprinkler and domestic use) is the encouraged method of freeze protection.
- 3) Insulation may be used as freeze protection for piping if the building or spaces containing piping can be maintained at a minimum of 40 degrees F at all times. The use of batt or blown-in insulation for freeze protection may be approved by the Fire Code Official and installed per current edition of NFPA 13D.
- 4) All antifreeze solutions shall be a listed factory premixed solution and approved in accordance with NFPA 13D and the California Fire Code which allows only propylene glycol solutions of no more than 40% or glycerin solutions of no more than 50% by volume. If a





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backflow or Reduced Pressure (RP) device is installed, the system shall have an approved expansion tank. The RP device shall be approved by the local water purveyor.

- 5) A sign or sticker shall be placed on all systems using antifreeze solutions at or near the main riser. The sign shall contain the necessary information permanently and clearly written as shown in **Diagram F-2.3**.

### **SELF CONTAINED AUTOMATIC RESIDENTIAL SPRINKLER SYSTEMS**

- 1) In areas where an inadequate water supply exists, an approved automatic self-contained water system, meeting all other requirements in this standard and NFPA 13D may be installed. Such systems shall be listed for fire protection and be installed per the manufacturer's specifications.
- 2) Self-Contained systems may use a pump with an approved primary power supply or compressed gas pressurization. An approved water supply tank shall be sized sufficiently to provide a minimum of ten (10) minutes of sprinkler demand, and contain an automatic refill. Self-Contained systems shall be flow tested at final inspection using a method approved by the fire code official, using the manufacturer's recommendations.
- 3) If a pump is used, it must be freeze protected in accordance with this standard.

### **SPECIAL SITUATIONS**

- 1) For systems where it may be difficult to verify the design by means of hydraulic calculations, such as those that are fed by a water pump systems from a well or a tank, or those systems where visual inspection and verification of the overhead or underground piping is otherwise not possible, the fire code official may require a water flow ("bucket test") inspection. The test shall include the two most remote sprinkler heads flowing water into an approved container(s), using an approved method to measure the observed flow and compare to the listed flow and pressure of the sprinkler head. Bucket tests may be performed in combination with the Overhead Rough inspection or the Final inspection.
- 2) Spray applied or wrapped polyurethane foam insulation that comes into contact with non-metallic fire sprinkler piping, whether such is required for freeze protection or not, shall be listed for such use with pipe and applied according to the manufacturer's recommendations. Information about any polyurethane foam insulation shall be made available to the fire code official upon request.



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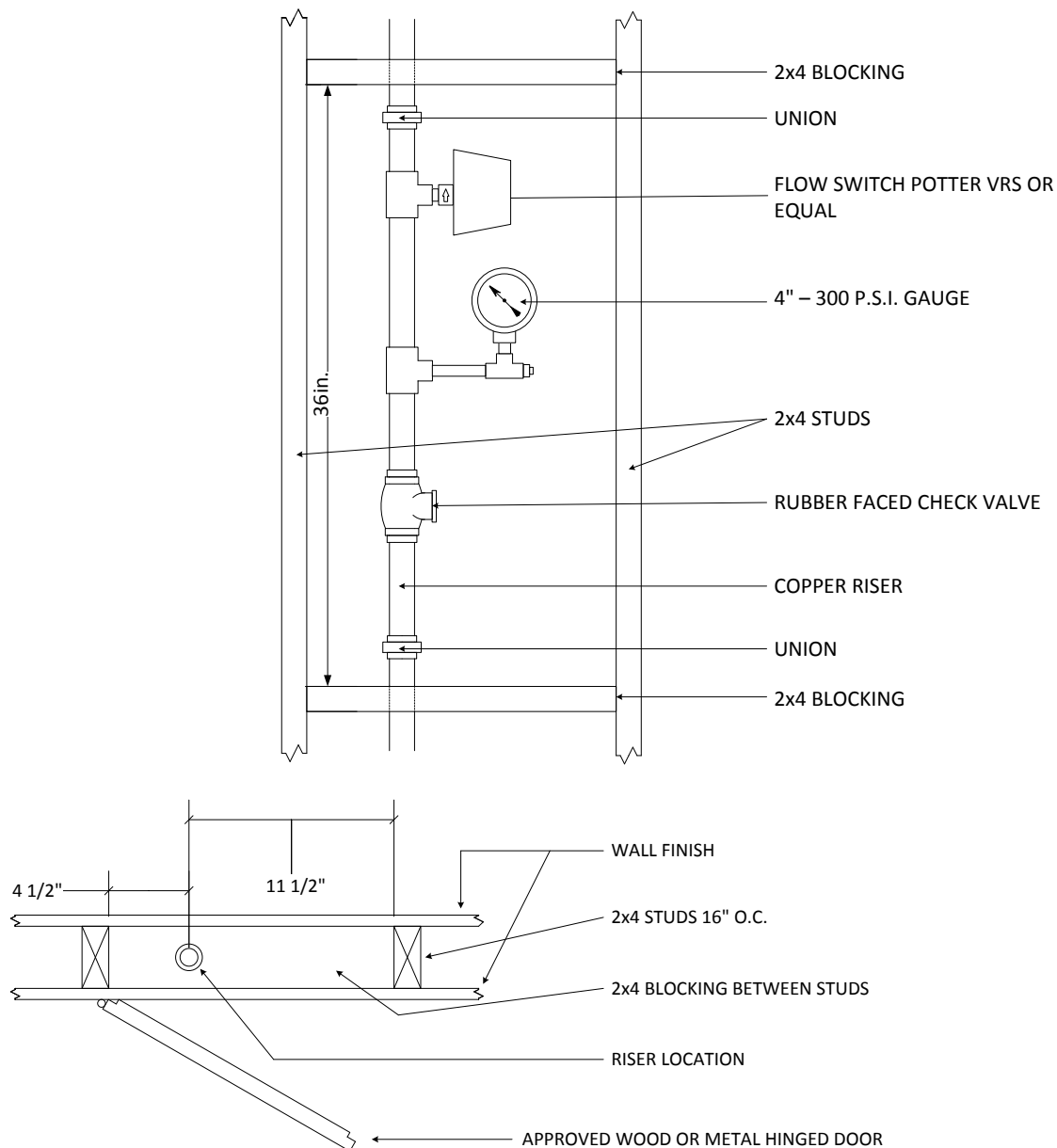
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**DIAGRAM F-2.1: RISER ACCESS PANEL DETAILS**







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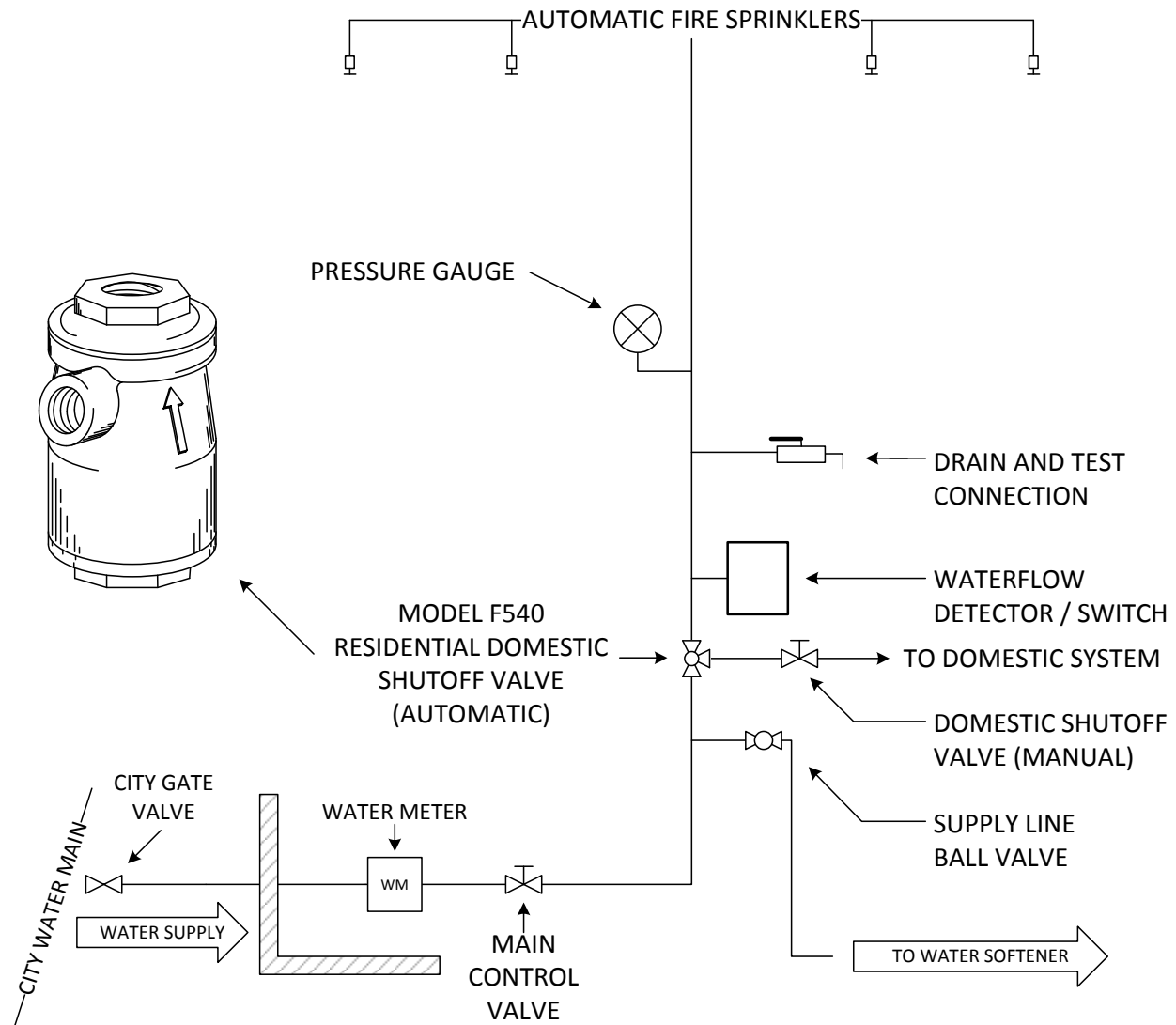
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**DIAGRAM F-2.2: RESIDENTIAL AUTOMATIC DOMESTIC SHUTOFF VALVE**





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**DIAGRAM F-2.3: SAMPLE PLACARD FOR ANTIFREEZE SYSTEMS**

**ANTI-FREEZE SYSTEM**

The fire sprinkler system in this building contains an anti-freeze solution for protection against freezing.

Type of anti-freeze:

Manufacturer:

Trade name & brand:

Solution concentration:  %

System volume:  gallons

Protected to:  degrees (°F/°C)

Location:

Date tested: